

'People can stop. People can fast-forward. This is random access radio.'

A world of data ⁵⁻³¹⁻⁹³ coming to your fingertips

Editor's note: Everyone knows about the wireless new gadgets that allow people to phone or fax their offices from remote locations. But what about using the same technology to make all sorts of vital information easily accessible to the masses? The second installment of the three-part series "Wiring The Planet" joins the engineers who are working to do just that.

By Frank Bajak
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COLUMBUS, Ohio — The room is filled with 40-odd workstations, but most of the computer engineers are in a semicircle around a single terminal. Internet Talk Radio has hit the airwaves.

Well, sort of.

This isn't radio in any traditional sense. It's not being broadcast by any big radio stations just yet. But it has been sent around the world on the Internet, a rapidly expanding web of interconnected computer networks.

"The first radio show designed to be played on your computer," the announcer says. The engineers grin. The voice and a synthesized jingle come from a pair of midget speakers, but all eyes follow the modulated sound readout on a monitor.

This is digital radio, a bunch of professionally mixed audio files

[See SATELLITES, D-2]



AP/CHRIS KASSON

Carl Malamud, producer of Internet Talk Radio, was one of the computer heavy hitters who came to Columbus.

◆ SATELLITES from D-1

World of data at your fingertips

that can be played by the synthesizers built into many desktop computers — just like the music and sound-effect files that enliven computer games.

But that's where the radio metaphor beings to blur.

"People can stop, people can fast-forward — this is random access radio," Carl Malamud says of his brainchild.

The 33-year-old writer and networking engineer has, at least initially, geared Internet Talk Radio toward computer network architects, nearly 600 of whom were in Columbus for a week-long Internet Engineering Task Force meeting.

The engineers, a supercharged species from 17 countries, have wired a Hyatt Regency with high-speed data links. Their designs must enable the big jump in scale to the networks of the future. And the tools they're developing must allow computer novices to easily browse the Internet's rich but elusive resources as one might the local library.

One topic is knowledge robots, the resource discovery tools of tomorrow that will be dispatched across networks with orders to bring back specified information or go buy or check the price on something.

Another is improving audio and video transport on the network.

A narrow interest group? Sure.

But Internet Talk Radio inhabits a medium with enormous potential as audio and eventually full-motion video enter the personal computer market and more and more people hook up to computer networks from home or work.

Ambitious plans

Malamud has big plans. He already has sold the National Press Club on letting him "broadcast" its luncheons and has visions of holding truly interactive national town meeting the computer-shy easy access to the wealth of information the technically adept can extract. But plenty of robust navigation and information-grabbing tools already are available.

Wander through the computer room and you'll see the latest software packages get some rigorous testing from the best in the business.

At one workstation, Fred Whiteside is setting up his Boston company's new program that allows people to interact with the Internet via Microsoft's popular Windows operating system. Windows is in

GETTING AROUND THE INTERNET

The Internet has become such a labyrinthine jumble of networks that software tools to locate information are essential. Some of the more widely used tools, and how they could be compared to similar services on the telephone system:

ARCHIE:

Created by two Montreal graduate students, **archie** searches public archives, telling you all the different places on the Internet where the files you seek can be found.



Telephone analogy: **Operator assistance**

GOPHER:

Developed at the University of Minnesota, this program uses menus (lists of choices) to browse through available information and transfer it to your own computer.



Telephone analogy: **Yellow pages**

WAIS:

The **Wide Area Information Server**, developed in a joint project by companies including Apple Computer and Dow Jones, lets you search many databases by asking questions. A popular tool for "publishing" databases on the Internet, the program responds to your questions with a list of possible choices. The program can then be re-run at regular intervals, creating a sort of personal electronic newspaper.



Telephone analogy: **Operator assistance, but smarter than archie or Veronica**

VERONICA:

There are now so many Gophers on the Internet that people are having a hard time finding the information they need. **Veronica**, developed at the University of Nevada in Reno, is an example of how new tools develop from older ideas. Like **archie**, it collects all the words in the **Gopher** menu lists. Like **WAIS**, Veronica builds a database that can be searched with simple questions. It then builds a menu list of choices.



Telephone analogy: **Operator assistance**

WORLD WIDE WEB:

Hypertext is the ability to link words, pictures, and ideas with other ideas, pictures and words. Designed by a programmer at the European Laboratory for Particle Physics in Switzerland, **Worldwide Web (WWW)**, lets you navigate through linked information sources around the Internet. This can be done in a windows environment by clicking with a mouse on words or other "buttons."



Telephone analogy: **Call forwarding**

SOURCE: Clearinghouse for Networked Information Discovery and Retrieval

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millions of corporate and home computers, widely popular because of its relative ease of use.

At another terminal, a small group gathers around Tim Berners-Lee as he guides a reporter through his 2½-year-old software invention, **World Wide Web**. A dazzling research tool, it seeks out information by establishing a web of interconnections in a world of random resources.

The secret is hypertext, highlighted sections of text — or pictures themselves — that the user points to with a computer mouse and clicks on. That brings a new, more specific body of information onto the screen.

"The Web is a set of associations, and in a way the Web is a representation of mankind's knowledge," says Berners-Lee, a ruddy-cheeked Brit who has moved via the software into files at his workplace, the European Parti-

cle Physics Laboratory in Switzerland.

Global reach

"We're going halfway across the world and picking up stuff in less than a second," says the Oxford-trained Berners-Lee, 37, whose mind so races he often leaves sentences unfinished.

"I'm really interested in getting this into grade schools," he says.

Eight hours later, as midnight approaches, the computer room still is packed. But now the interaction is exclusively between human and computer.

Some 50 people are riveted to terminals, and no one is talking. There is only the low hum of computer power units and the muted click of keystrokes.

"These are the people that built the Internet," says Malamud, and this is no ordinary convention. "They come here to work."